

A PRELIMINARY STUDY OF THE GENUS STYLOPS IN CALIFORNIA (Part II)¹

(Strepsiptera, Stylopidæ)

BY RICHARD M. BOHART

University of California, Berkeley

Seven species of *Stylops* have been recorded from California. In the present paper five new species are described. The variation existing among the females of a single species throws considerable doubt upon the validity of the numerous species which have been named in the past on the basis of single females. The chief difficulty arises from the fact that characters which are constant in the females of one species may be inconstant in another. Unless otherwise stated types of the new species are in the collection of the California Academy of Sciences.

The following key is necessarily cumbersome because of the rarity of unique specific characteristics. It is by no means intended to be final as many of the less common species have yet to be described.

KEY TO THE FEMALES OF THE GENUS STYLOPS RECORDED FROM CALIFORNIA

1. Mandibles with a prominent basal tubercle (Part I, figs. 18, 21)¹*vandykei* Bohart
- ... Prominent basal tubercle lacking.....2
2. Cephalothorax with the spiracles located very far back so that the distance between the spiracles and the apex is at least eight-tenths as long as the distance between the spiracles; cephalothorax longer than broad (figs. 14, 15, 18)....*elongatus* Bohart
- ... Cephalothorax with the distance between the spiracles and apex less than eight-tenths as long as the distance between the spiracles3
3. With two transverse pigment spots on either side of the middle at the anterior limit of the spiracular region; cephalothorax narrowed strongly toward the apex; basal band darker on the posterior half, with the anterior margin wavy and indistinctly outlined (figs. 10, 11).....*apicalis* Bohart
- ... Without the above combination of characters.....4
4. Cephalothorax longer than broad; wide at the mandibles; outer rim of the mandibles with a swelling just above the middle and with a usually discernible ventral tubercle above the swelling (figs. 17, 20).....*duboisii* Bohart

¹ A Preliminary Study of the Genus *Stylops* in California (Part I), Pan-Pacific Entomologist, Vol. XII, pp. 9-18.

- ... Without the above combination of characters.....5
5. Spiracular area transparent and well defined; anterior margin of basal band convex; cephalothorax broader than long (figs. 16, 19)*centroclarus* Bohart
- ... Without the above combination of characters.....6
6. Cephalothorax spade-shaped with the apical angles sharp; mandibles usually not incurved above the middle; anterior margin of basal band usually strongly convex.....7
- ... Cephalothorax more or less shovel-shaped with the apical angles very broad and rounded; or if not, mandibles incurved above the middle, or anterior margin of the basal band not convex8
7. Lateral margins bent distinctly outward at the base of the head which is very broad (Part I, figs. 16, 22).....*timberlakei* Bohart
- ... Lateral margins straight or slightly convex from spiracles to apical angles; base of head relatively narrow (Part I, figs. 15, 20)*pacificus* Bohart
8. Spiracles prominent laterally; mandibles incurved beneath the strongly rounded outer apex; apex of cephalothorax broadly truncate*californica* Pierce
- ... Spiracles at most barely exceeding the margins; or if slightly prominent, mandibles not strongly rounded at outer apex, or cephalothorax not broadly truncate at apex.....9
9. Basal band much lighter on the posterior one-half, convex on anterior margin; rim of mandibles thick (figs. 12, 13)*heterocingulatus* Bohart
- ... Basal band evenly colored, not convex on anterior margin; rim of mandibles not unusually thick.....10
10. Lateral margins angled behind the spiracles; mandibles incurved below the outer apex, usually protruding over the margins of the apical angles of the cephalothorax (Part I, figs. 17, 19).....*medionitans* Pierce
- ... Lateral margins usually smoothly rounded behind the spiracles; mandibles not incurved below the outer apex, lying wholly within the outlines of the cephalothorax.....*subcandidæ* Pierce

Stylops centroclarus Bohart, new species

(Figs. 1, 5, 7, 16, and 19)

The male of *centroclarus* can be distinguished by the form of its aedeagus from all other described species with the possible exception of *cuneiformis* Bohart from which the shape of the scutellum readily separates it. The female differs from all other thus far described species by the clear, colorless, well-defined spiracular area. It belongs to the group of species para-

sitic on bees of the subgenus *Trachandrena* and may be further separated from *claytoniæ* Pierce and *hippotes* Pierce by its more prominent spiracles and its reduced area in front of the mandibles; and from *salicifloris* Pierce by the convexity of the anterior margin of the basal band.

Male. Black, abdomen fuscous, tarsi light. Antennæ relatively long, segments three to six with the length ratio 49:22:14:20 respectively. Metaprescutum broad and rounded, distinctly separated from the scutellum by a depressed scutal area; scutellum very broad posteriorly and evenly rounded toward the apex; postlumbium short and broad; postscutellum longer than the rest of the metathorax, broadly rounded posteriorly. Aedeagus very slender and angulate, bent at less than a right angle, apical margin slightly more than one-third the length of the main axis. Length excluding the antennæ, 3.35 mm.; length of antennæ, 0.97 mm.; width of head, 0.99 mm.; wing expanse, about 5.8 mm.

Female. Cephalothorax with a ferrugino-testaceous lateral margin extending inward as much as one-fourth the width of the thorax, central portion pale, spiracular area almost transparent, colorless, and bounded anteriorly by a transverse darkened area, basal band fuscous. Cephalothorax broader than long, apical margin straight, lateral margins irregularly convex, angled behind the spiracles; mouth hemispherical, area in front of mandibles very small, mandibles bluntly toothed apically, outer edge rounded, inner edge bent at the middle and straight from the bend to the apex; spiracles large and prominent; basal band evenly colored, half as long as wide, convex along the anterior margin, and more than half on the cephalothorax. Width of cephalothorax at spiracles, 0.97 mm.; width at base of mandibles, 0.35 mm.; width at base of head, 0.50 mm.; width at base of cephalothorax, 0.70 mm.; length from front edge of spiracles to apex, 0.64 mm.; length of cephalothorax, 0.90 mm.

Triungulinid. Body oblong-ovate, broadest at the middle; length of body excluding stylets, 0.156 mm.; length of stylets, 0.068 mm.; width of head, 0.034 mm.

Holotype, male, Berkeley, California, March 24, 1936. Allotype, female, Calaveras Dam, Santa Clara Co., California, April 14, 1936 (with triungulinids). Paratypes, one female, Berkeley, California, March 14, 1936; two females, same data as allotype. All type material collected by G. E. Bohart.

Host. *Andrena* (*Trachandrena*) sp. near *salicifloris* Ckll. (det. by P. H. Timberlake) taken on blackberry and poison oak.

Stylops duboisi Bohart, new species

(Figs. 2, 3, 6, 8, 17, and 20)

The manner in which the fourth antennal segment arises from the third separates the male of this species at once. Also the sixth antennal segment is longer than the fourth and the prescutum is almost a perfect pentagon. The female is also easy to distinguish on the basis of the shape and uniform color of the basal band, the angled outline of the cephalothorax, the small size, and particularly the form of the mandibles.

In addition to the collection and donation of many other specimens, Mr. J. J. Du Bois furnished most of the type series of this species and I take pleasure in naming it in his honor.

Male. Black, abdomen fuscous, tarsi light. Antennæ with fourth segment inserted about half its length from the base of the third segment, fifth antennal segment bearing a distinct pore at the middle of the inner surface, antennal segments three to six with the length ratio 49:17:15:22 respectively; head relatively small, with a weakly sclerotized area dorsally in back of each antennal base. Metaprescutum almost a perfect pentagon, distinctly separated from the scutellum by a broad, depressed scutal area; scutellum broad and evenly rounded; postlumbium almost as long as wide; postscutellum longer than the rest of the metathorax, broadly rounded posteriorly. Aedeagus not strongly angulate, apical process relatively stout, apical margin about one-third the length of the main axis. Length excluding antennæ, 3.22 mm.; length of antennæ, 0.80 mm.; width of head, 0.77 mm.; wing expanse, about 5.4 mm.

Male puparium cap. Maxillæ represented by a pair of oval rings separated from each other by more than three times their diameter, mandibles separated by once and a half their breadth, eye sockets separated by three times their breadth.

Female. Cephalothorax testaceous, slightly darker toward the margins and lighter in the spiracular area, basal band fuscous. Cephalothorax longer than broad, apical margin straight, lateral margins nearly straight from the apical angles to an angle behind the spiracles; mouth oval, mandibles narrowed toward the apex and with a very small apical tooth, outer rim of mandibles not incurved but strongly swollen above the middle and with a hardly discernible ventral tubercle; spiracles exceeding the margins, large but flattened and receding into the cephalothorax; basal band more than half on the cephalothorax, evenly colored, half as long as wide, straight along the anterior margin. Width of cephalothorax at spiracles, 0.53 mm.; width at base of mandibles, 0.21 mm.;

width at base of head, 0.46 mm.; width at base of cephalothorax, 0.39 mm.; length from front edge of spiracles to apex, 0.37 mm.; length of cephalothorax, 0.56 mm.

Holotype, male, Davis, California, no date. Allotype, female, Davis, California, April 1, 1936. Paratypes, seven females, same data as allotype; one female, Davis, California, April 6, 1936, collected by the author. Unless otherwise stated, all type material was collected by J. J. Du Bois.

Host. *Andrena* (*Micrandrena*) sp. (det. by P. H. Timberlake) taken on willow.

Stylops elongatus Bohart, new species

(Figs. 4, 9, 14, 15, and 18)

The male of this species approaches *medionitans* Pierce in general appearance, but the scutellum of the latter is less rounded and the last antennal segment is considerably less than twice as long as the fifth. The female is unique in its great length of the cephalothorax in front of the spiracles. In extreme specimens this distance surpasses the breadth at the spiracles. The mandibles are peculiar and variable (two different types are illustrated). The apical area in front of the mandibles and the anterior margin of the basal band is usually convex.

Male. Black, abdomen fuscous, tarsi light. Head broad, eyes small; antennæ with segment four more than twice as long as five, segments three to six with the length ratio 50:23:10:19 respectively; maxillæ small, second segment relatively slender and shorter than antennal segment four. Metaprescutum rounded, separated from the scutellum by a depressed scutal area; scutellum very short and broad at the base; postlumbium wider than long; postscutellum longer than the rest of the metathorax, narrowly rounded posteriorly. Aedeagus slender toward the apex, not incised behind the process, apical margin bent at an obtuse angle below the inner process, apical process slender (tip of process broken in mounting). Length excluding antennæ, 3.05 mm.; length of antennæ, 0.79 mm.; width of head, 0.80 mm.; wing expanse, about 5.0 mm.

Male puparium cap. Maxillæ represented by a pair of oval rings separated from each other by twice their diameter, mandibles separated by once and a half their breadth, eye sockets separated by four times their breadth.

Female. Cephalothorax ferrugino-testaceous, lighter in the spiracular area which is bounded anteriorly by a transverse dark-

ened area, basal band fuscous. Cephalothorax longer than broad, apical margin not convex, lateral margins convex, strongly constricted behind the spiracles; area in front of the mandibles prominent, mouth oval, mandibles very bluntly toothed apically and with a very small lateral projection on the inner margin below the apical tooth, margin incurved on the outer side and with a prominent hump below the middle; spiracles exceeding the margins and placed very far back on the cephalothorax; basal band strongly convex on anterior margin and evenly colored. Width of cephalothorax at spiracles, 1.09 mm.; width at base of mandibles, 0.38 mm.; width at base of head, 0.61 mm.; width at base of cephalothorax, 0.68 mm.; length from front edge of spiracles to apex, 0.87 mm.; length of cephalothorax, 1.16 mm.

Holotype, male, Soboba Hot Springs, Riverside Co., California, February 26, 1936. Allotype, female, Riverside, California, April 26, 1934. Paratypes, five females, March and April in Riverside, California; two females, December and March respectively, Needles, California; and three females, Claremont, California. All type material was collected by P. H. Timberlake.

Host. The holotype and allotype were extracted from two specimens of *Andrena* sp. near *blaisdelli* Ckll. (*A. œnotheræ* Timberlake in manuscript). All paratypes were taken from *Andrena blaisdelli* Ckll. (det. by P. H. Timberlake).

Styllops apicalis Bohart, new species

(Figs. 10 and 11)

The two elongate transverse spots marking the anterior limit of the spiracular area will serve to distinguish the female of this species from *nuberculæ* Pierce and *swenki* Pierce which it resembles in general. Also, the unusual character of the basal band is outstanding.

Female. Ferrugino-testaceous at the sides, lighter toward the center; spiracular area bounded anteriorly by two elongate dark spots; basal band fuscous, becoming lighter toward the front. Cephalothorax as broad as long, strongly narrowed toward the mandibles, apical margin not convex at the middle, lateral margins convexly undulate; area in front of the mandibles prominent, mouth oval, mandibles incurved on the outer edge, outer rim not swollen above the middle but strongly calloused from the middle to the base, apical tooth large; spiracles small but exceeding the margins; basal band with anterior margin not well defined, irregular, depressed on each side of the middle. Width of cephalothorax

at spiracles, 1.07 mm.; width at base of mandibles, 0.40; width at base of head, 0.60 mm.; width at base of cephalothorax, 0.88 mm.; length from front edge of spiracles to apex, 0.75 mm.; length of cephalothorax, 1.07 mm.

Triungulinid. Body stout, oblong-ovate, head large. Length of body excluding stylets, 0.195 mm.; length of stylets, 0.092 mm.; width of head, 0.047 mm.

Holotype, female, Berkeley, California, April 17, 1935, G. E. Bohart collector. Paratypes, two females, Carmel, California, March 24, 1919; one female, Sausalito, California, May 2, 1920, C. L. Fox collector; one female, Berkeley, California, June 16, 1933 (with triungulinids), P. H. Timberlake collector.

Host. *Andrena saccata* Vier. (det. by P. H. Timberlake).

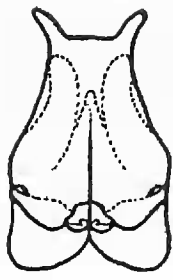
Stylops heterocingulatus Bohart, new species

(Figs. 12 and 13)

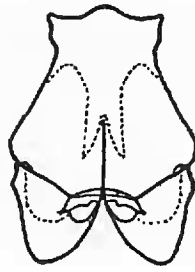
The odd coloration of the basal band and the thick-rimmed mandibles, which are often merely pointed, separate this species from *advarians* Pierce, *subcanidæ* Pierce, *claytoniæ* Pierce, and *vicinæ* Pierce which are somewhat similar in cephalothoracic outline. *Heterocingulatus* is the first species of *Stylops* to appear in the San Francisco Bay region where it occurs in February. In the Sacramento Valley it is most often taken in April.

Female. Cephalothorax ferrugino-testaceous, lighter in the spiracular area, basal band fusco-testaceous on the thorax, lighter on the abdomen. Cephalothorax a little longer than wide, apex straight at the middle, lateral margins convex, constricted at the base of the mandibles; mouth oval, mandibles with a thick rim which is incurved on the outer side and thickened below the middle, mandibles broad apically and strongly rounded at the outer apex, apical tooth small and not well defined; spiracles large but set in and hence not prominent laterally; basal band convex anteriorly, more than half on the cephalothorax. Width of cephalothorax at spiracles, 0.76 mm.; width at base of mandibles, 0.30 mm.; width at base of head, 0.48 mm.; width at base of cephalothorax, 0.52 mm.; length from front edge of spiracles to apex, 0.50 mm.; length of cephalothorax, 0.80 mm.

Triungulinid. Body slender, long oval. Length of body excluding stylets, 0.204 mm.; length of stylets, 0.094 mm.; width of head, 0.036 mm.



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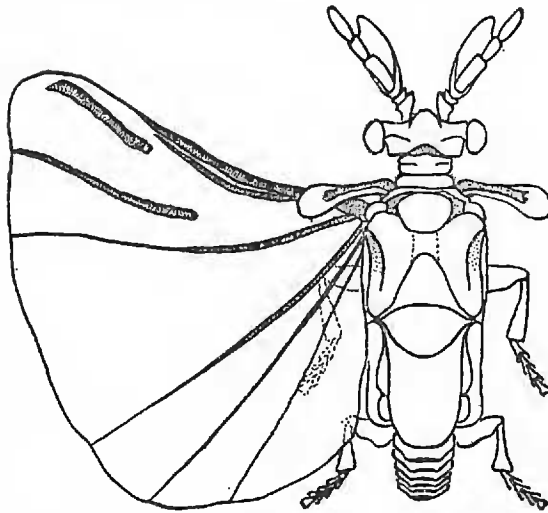
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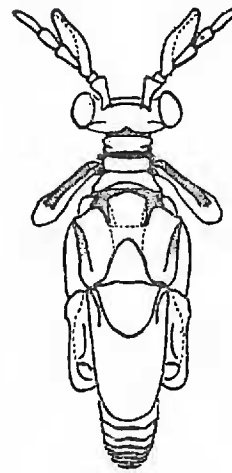
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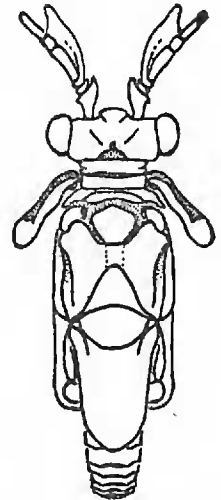
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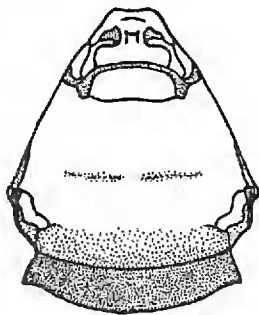
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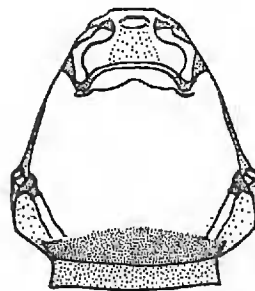
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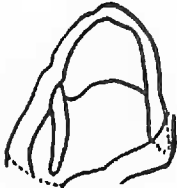
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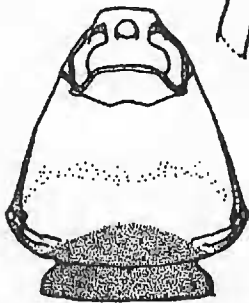
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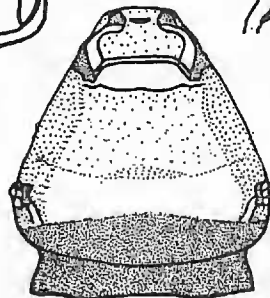
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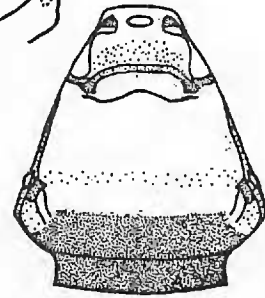
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Holotype, female, Davis, California, April 1, 1936, J. J. Du Bois collector. Paratypes, one female, same data as holotype; four females, Yolo Causeway, Yolo Co., California, April 24, 1936; two females, Yolo Causeway, Yolo Co., California, May 4, 1936 (with triungulinids). All paratypes were collected by the author unless otherwise indicated.

Host. *Andrena pensilis* (Timberlake manuscript) and *Andrena* sp. near *angustitarsata* Vier. (Berkeley, California) (determinations by P. H. Timberlake).

Correction: In Part I of this paper, Pan-Pacific Entomologist Vol. XII, No. 1, on page 13, line 12, "prescutum" should be changed to scutellum" and in line 13 of the same page, the second "wide" should be changed to "long."

EXPLANATION OF PLATE

Fig. 1. *centroclarus*, venter of male metathorax. Fig. 2. *duboisii*, venter of male metathorax. Fig. 3. *duboisii*, antenna. Fig. 4. *elongatus*, antenna. Fig. 5. *centroclarus*, aedeagus. Fig. 6. *duboisii*, aedeagus. Fig. 7. *centroclarus*, male. Fig. 8. *duboisii*, male. Fig. 9. *elongatus*, male. Fig. 10. *opicalis*, female mandible. Fig. 11. *apicalis*, female cephalothorax. Fig. 12. *heterocingulatus*, female cephalothorax. Fig. 13. *heterocingulatus*, female mandible. Figs. 14 and 15. *elongatus*, female mandibles. Fig. 16. *centroclarus*, female mandible. Fig. 17. *duboisii*, female mandible. Fig. 18. *elongatus*, female cephalothorax. Fig. 19. *centroclarus*, female cephalothorax. Fig. 20. *duboisii*, female cephalothorax.

A NEW LOCALITY FOR GRYLLOBLATTA

Upon a recent trip, November 27, 1936, through southern Oregon, I collected near Crater Lake, two specimens of the quite rare *Grylloblatta*, both females. To my knowledge this is a new locality, the nearest record being in Plumas County, California.

Both specimens were found beneath the same rock near a spring at an elevation of about 6500 feet. Further investigation produced no more individuals.

Although both females are only 16 mm. long, they appear to be mature and seem to be of the same species, *Grylloblatta campodeiformis*, described by Walker from Banff, Alberta in 1914.—James E. Elsea.